Driving Innovation through Federal Investments at the Department of Energy

Presented by Secretary Ernest Moniz

April 29, 2014

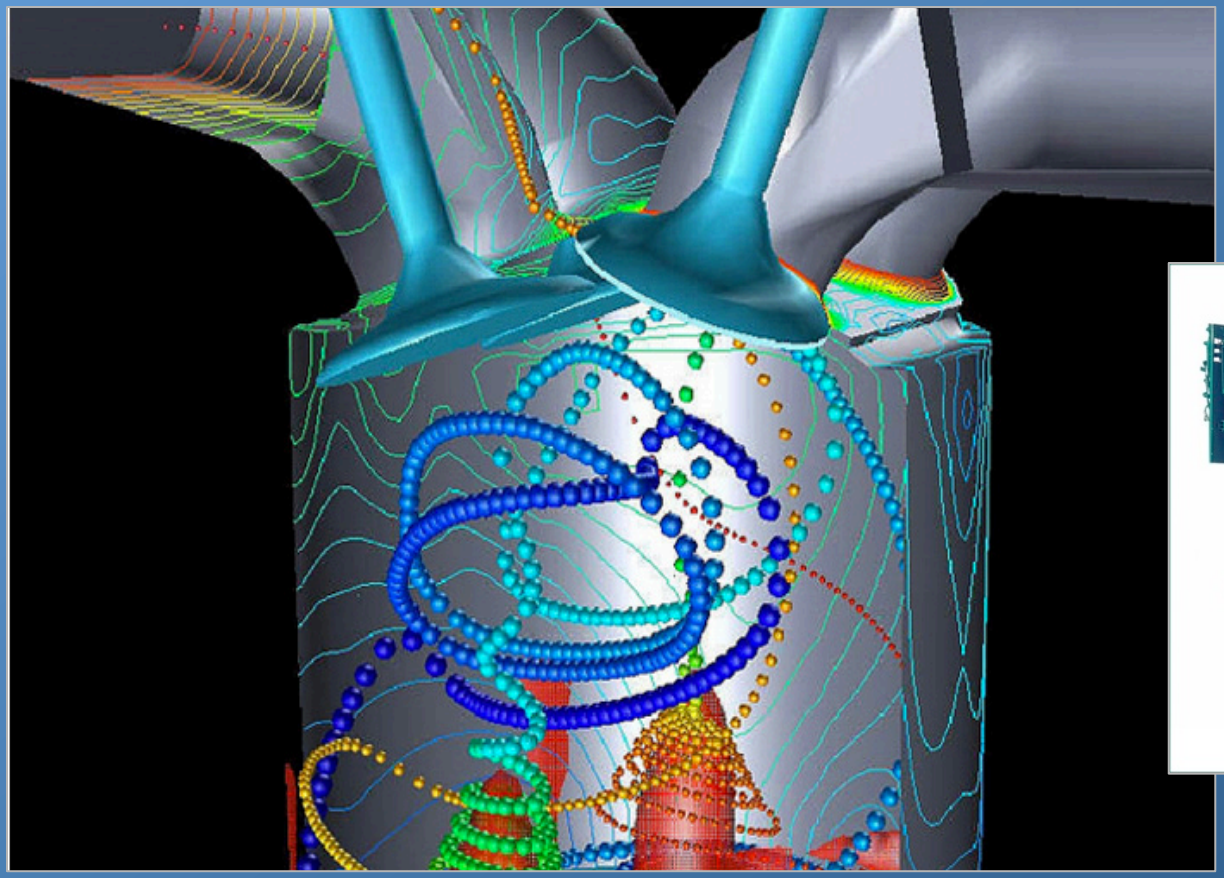
Powering U.S. Defense

The B61 tactical thermonuclear gravity bomb

USS Nautilus, the world's first nuclear powered submarine (1954)

Core Capabilities

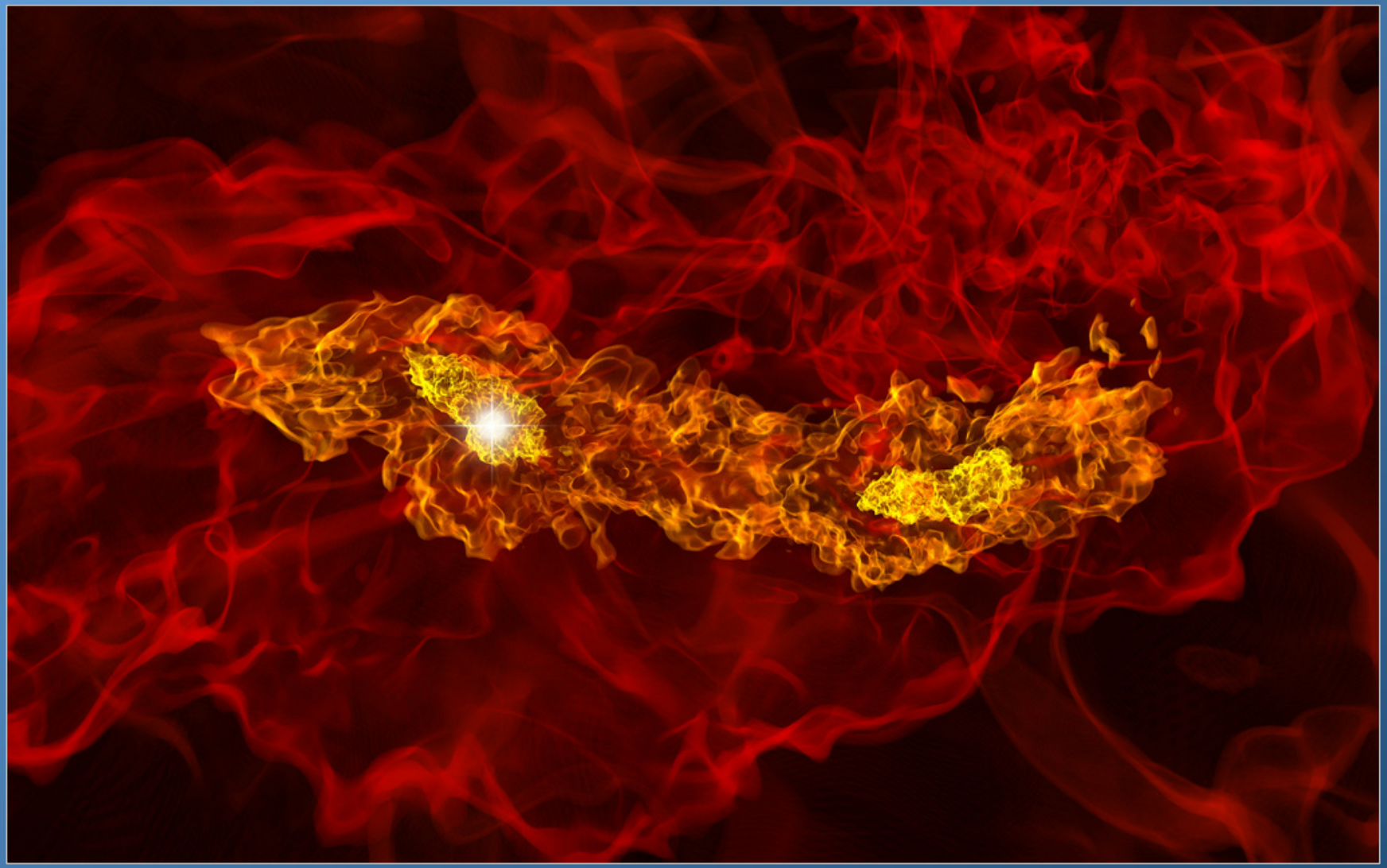
Supercomputing



Simulation of internal combustion at Los Alamos

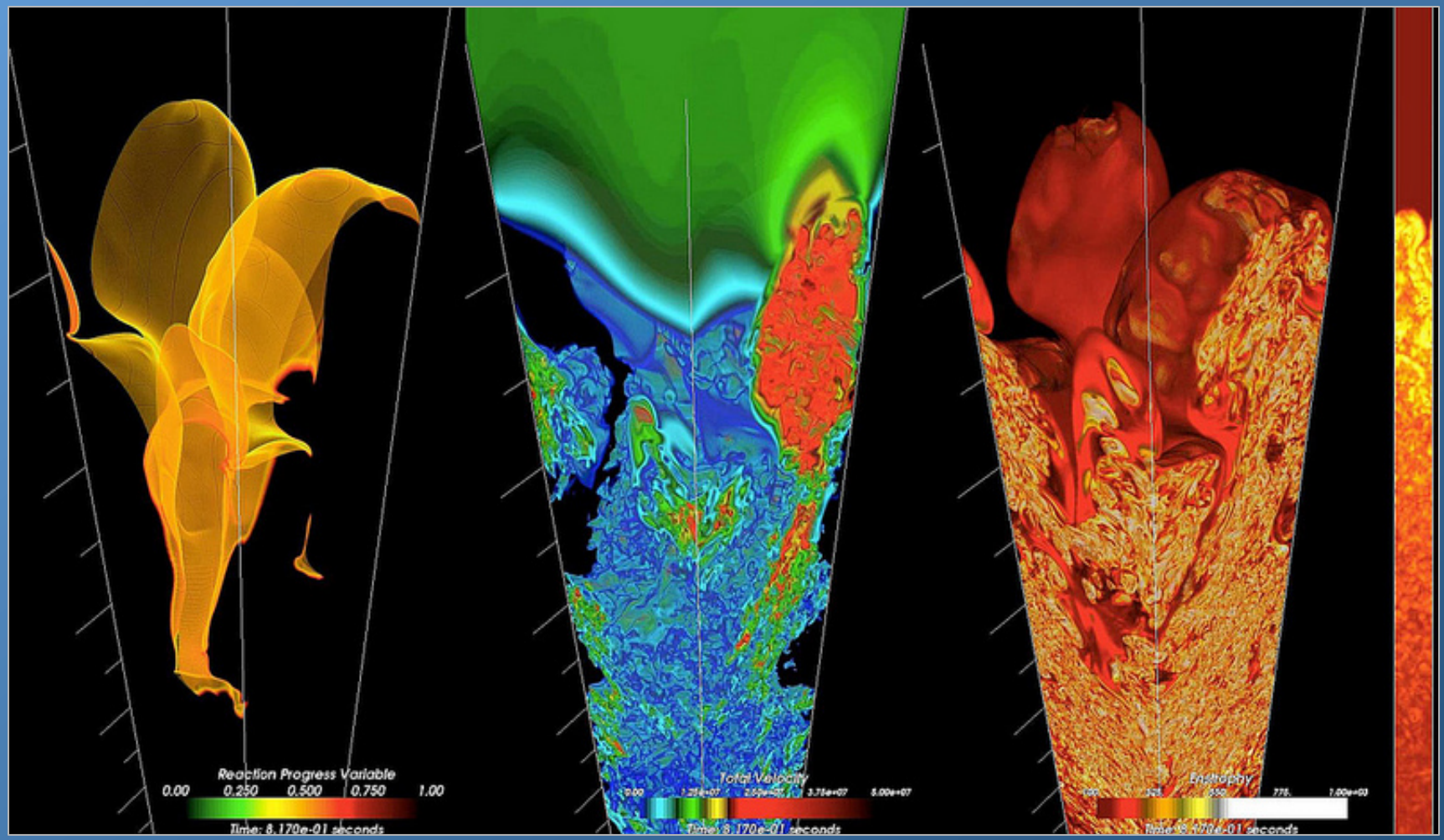
Resulted in development of highly efficient test engine by Cummins

Computational Modeling



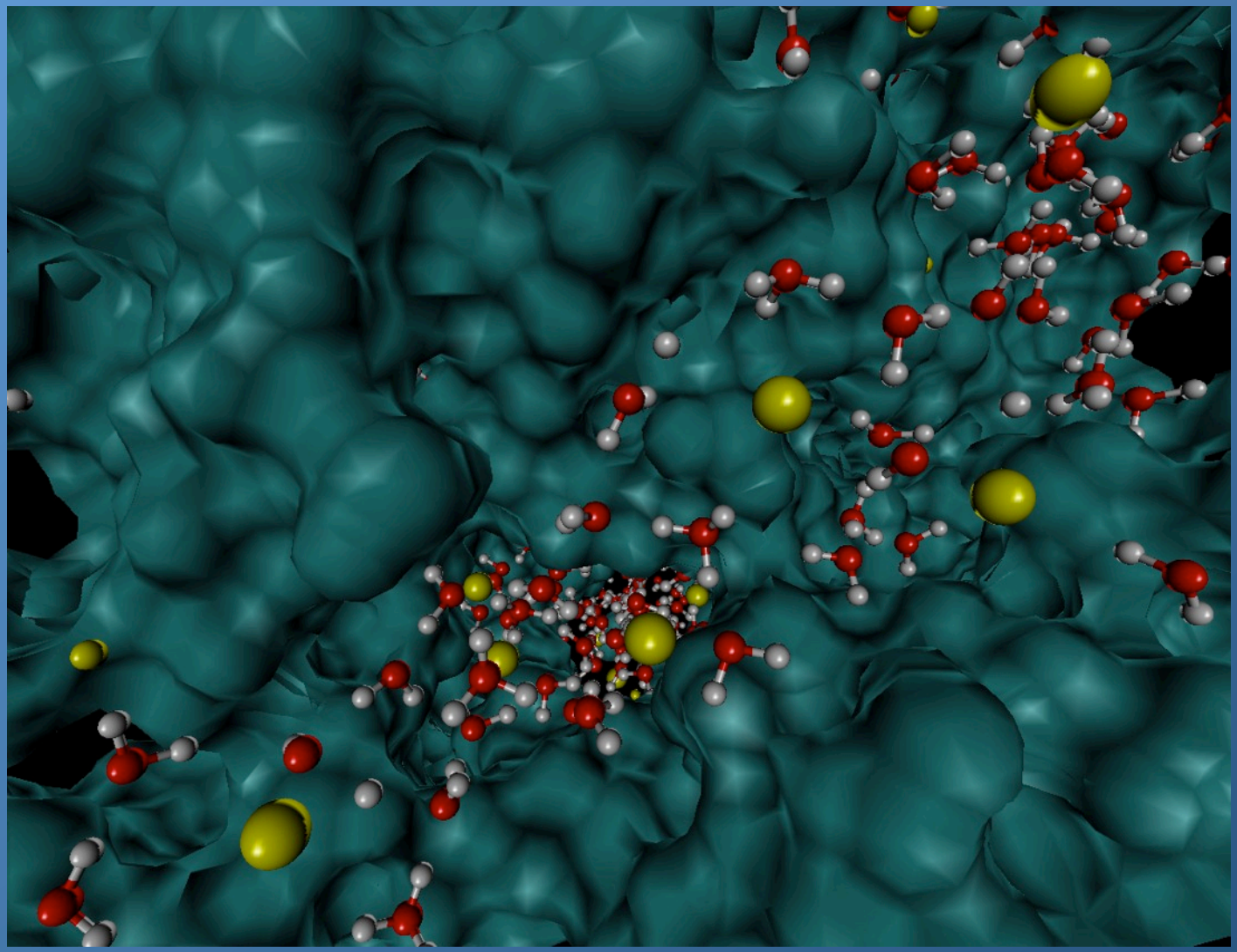
Computer-simulated image shows the formation of two high density regions in the early universe at SLAC National Accelerator Laboratory

Supercomputing



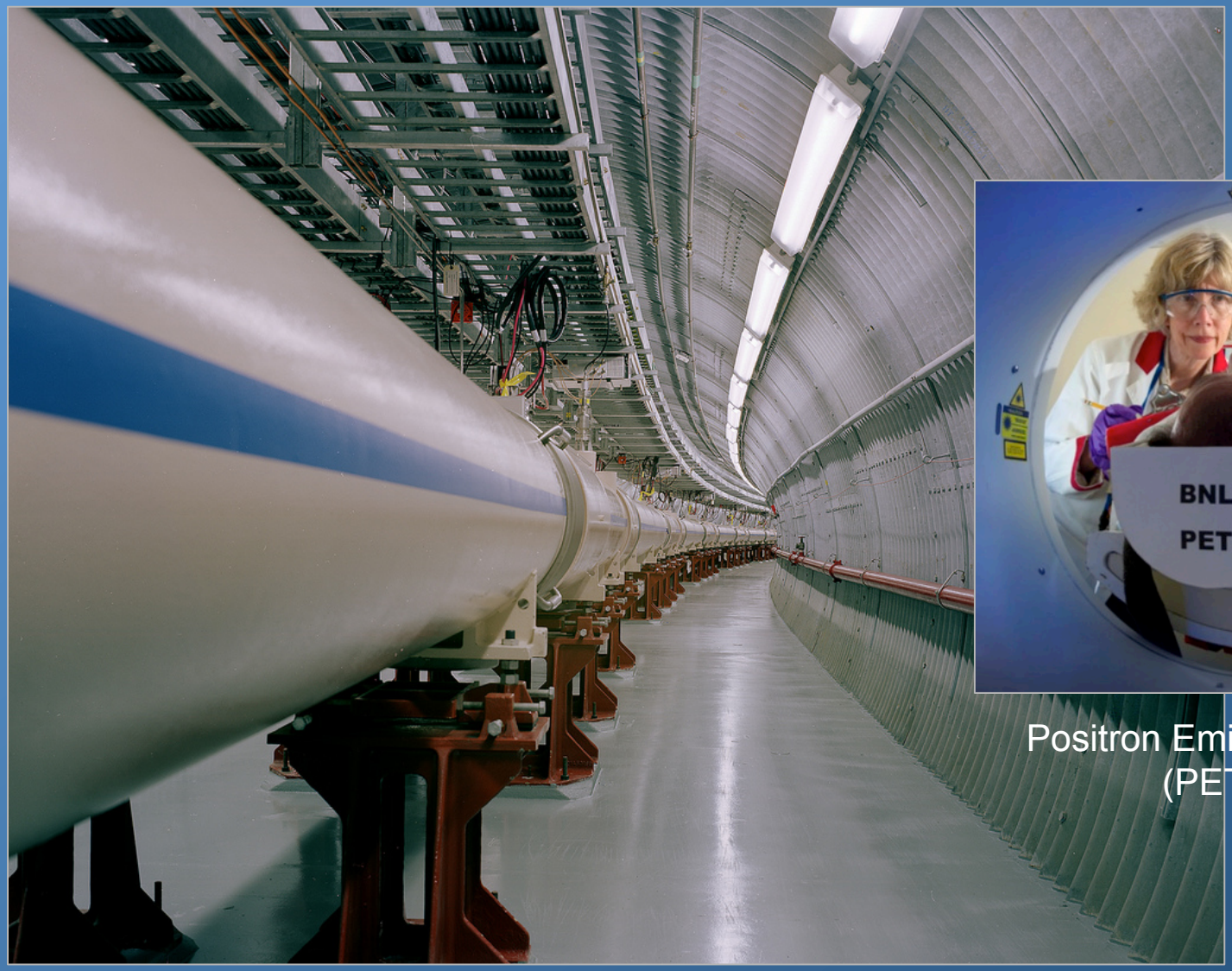
Visualizations of a supernova, developed at Argonne National Lab

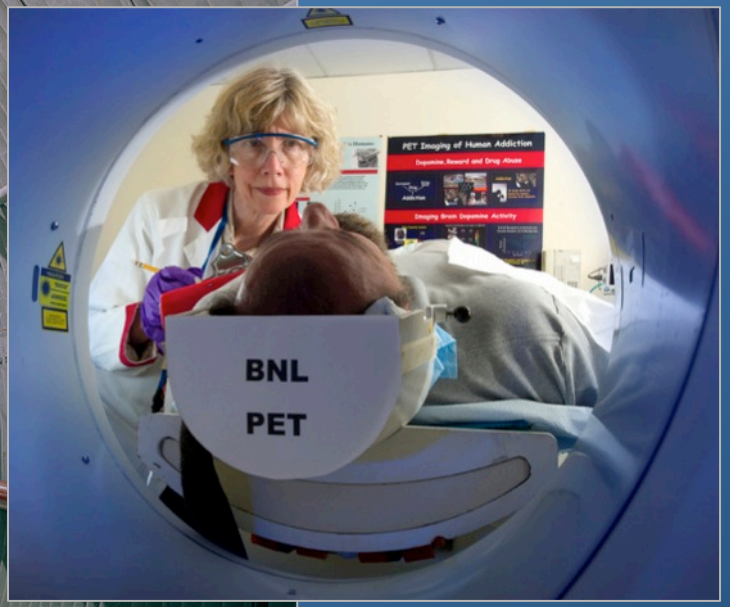
Computational Chemistry



Computational chemistry at Pacific Northwest National Laboratory

Particle Accelerators

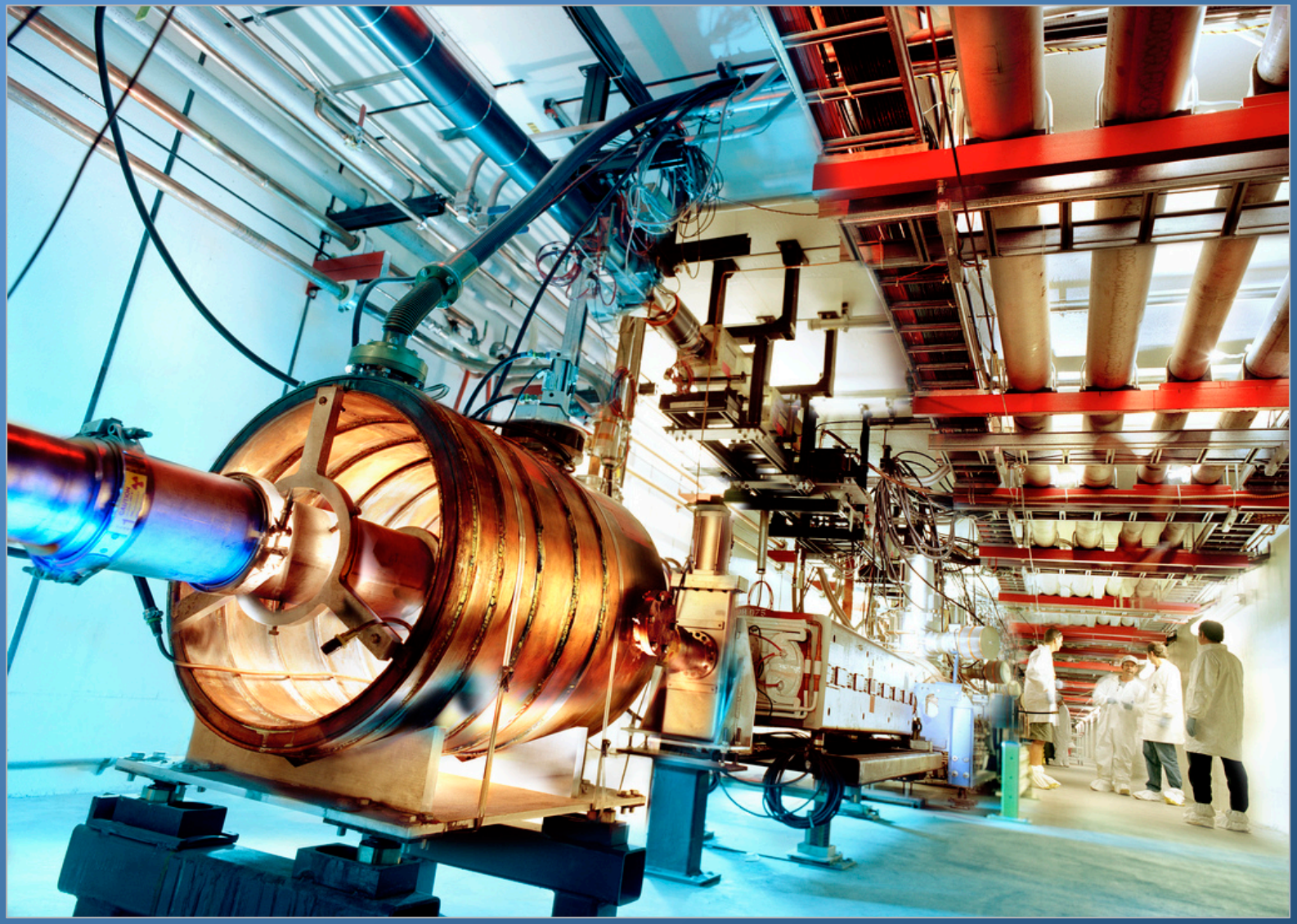




Positron Emission Tomography (PET) imaging

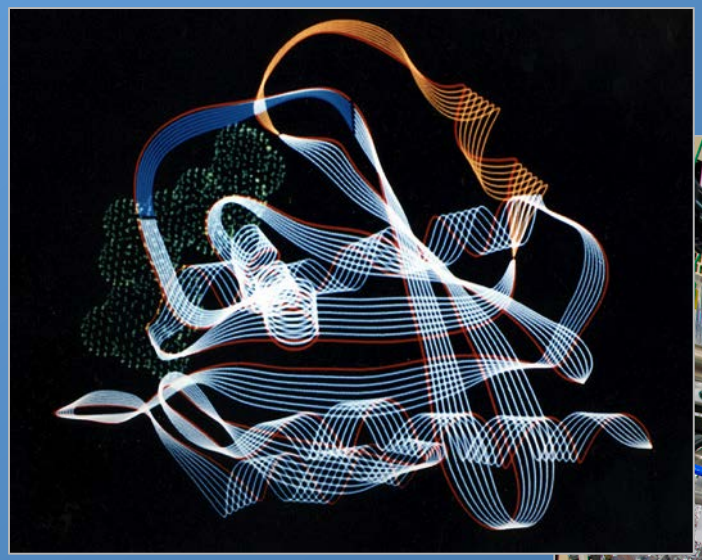
Brookhaven National Laboratory's Relativistic Heavy Ion Collider

Particle Accelerators

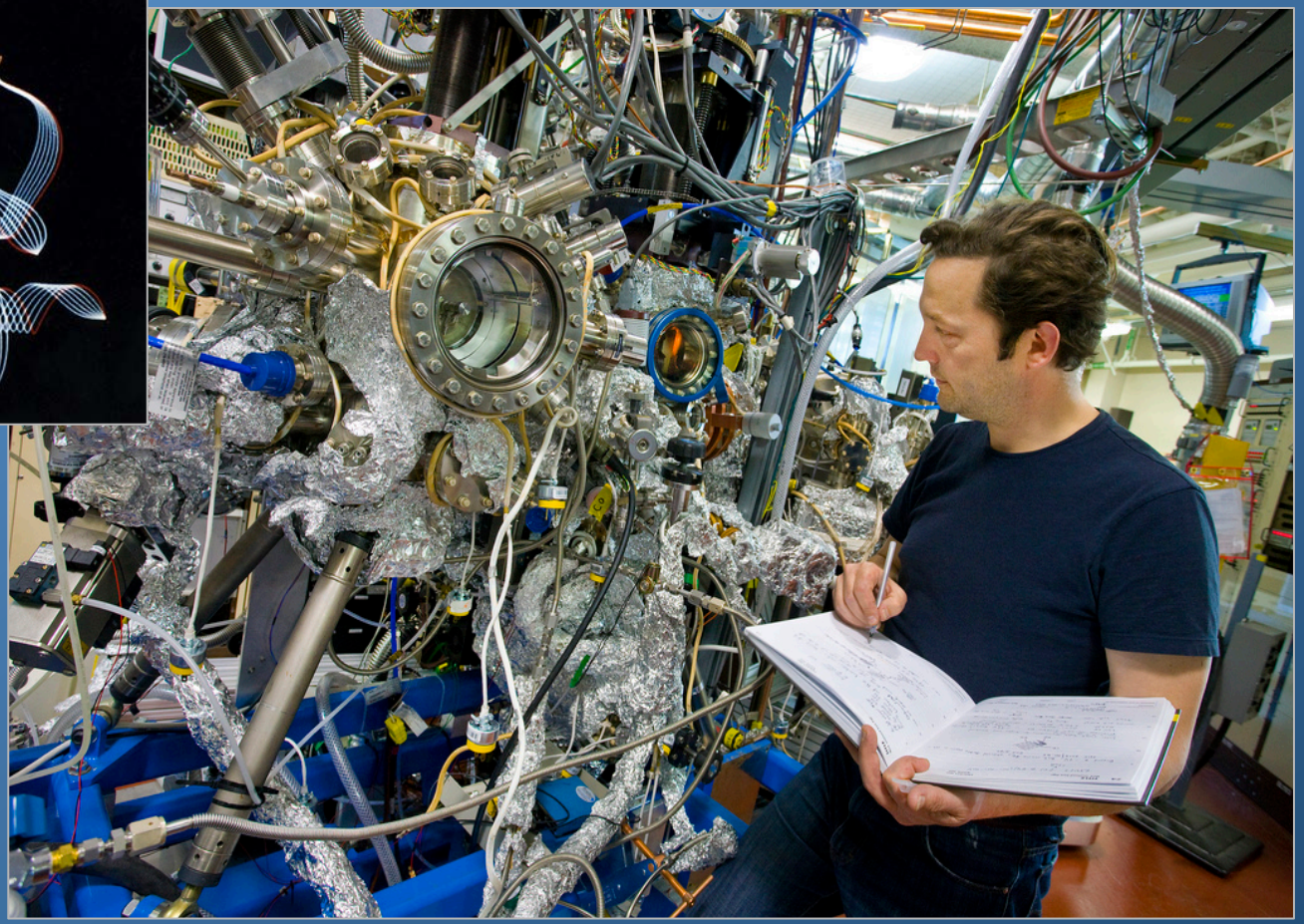


Fermilab's Tevatron accelerator

X-Ray Light Sources

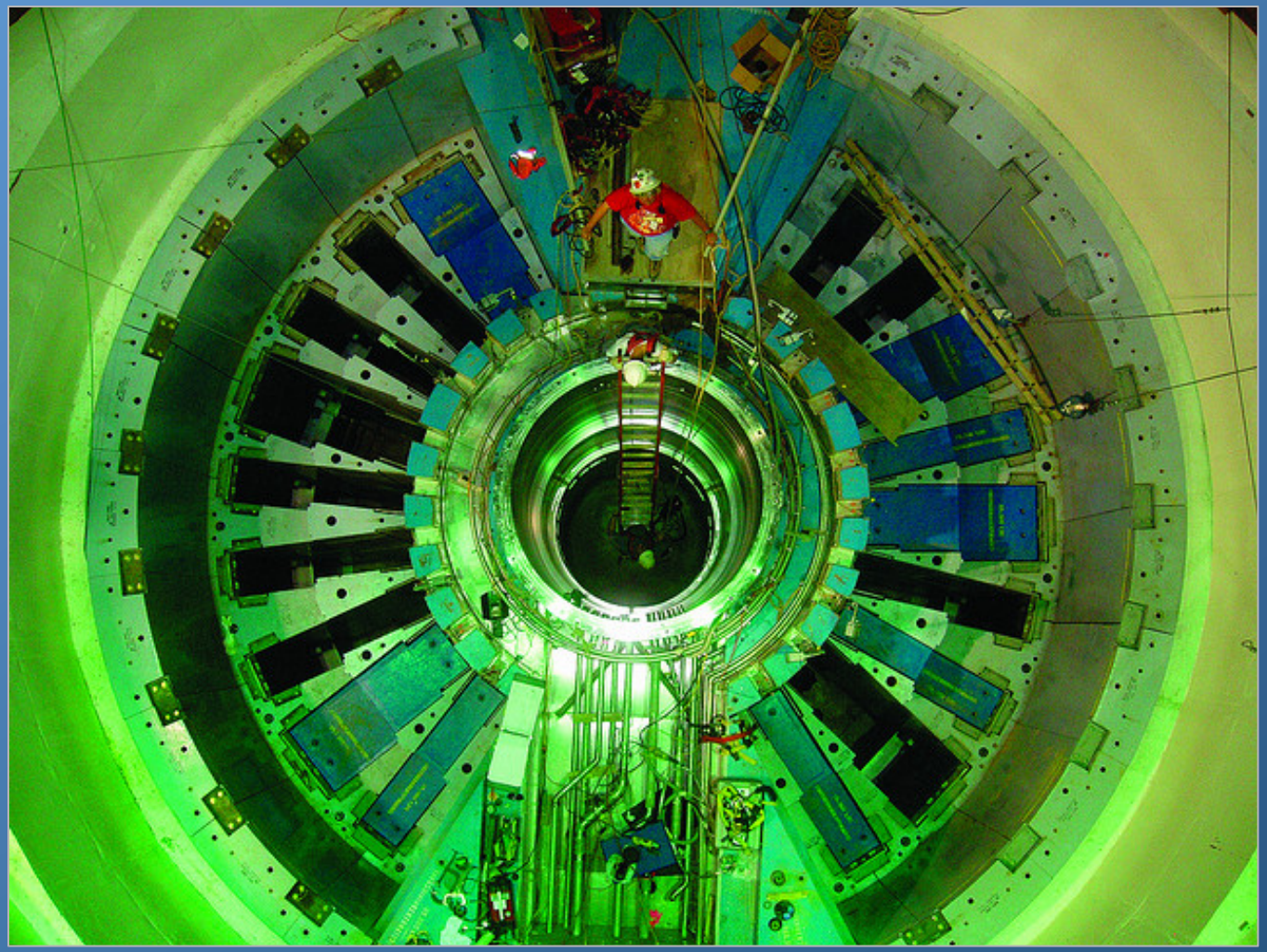


Backbone of the normal gas protein, as determined by x-ray diffraction



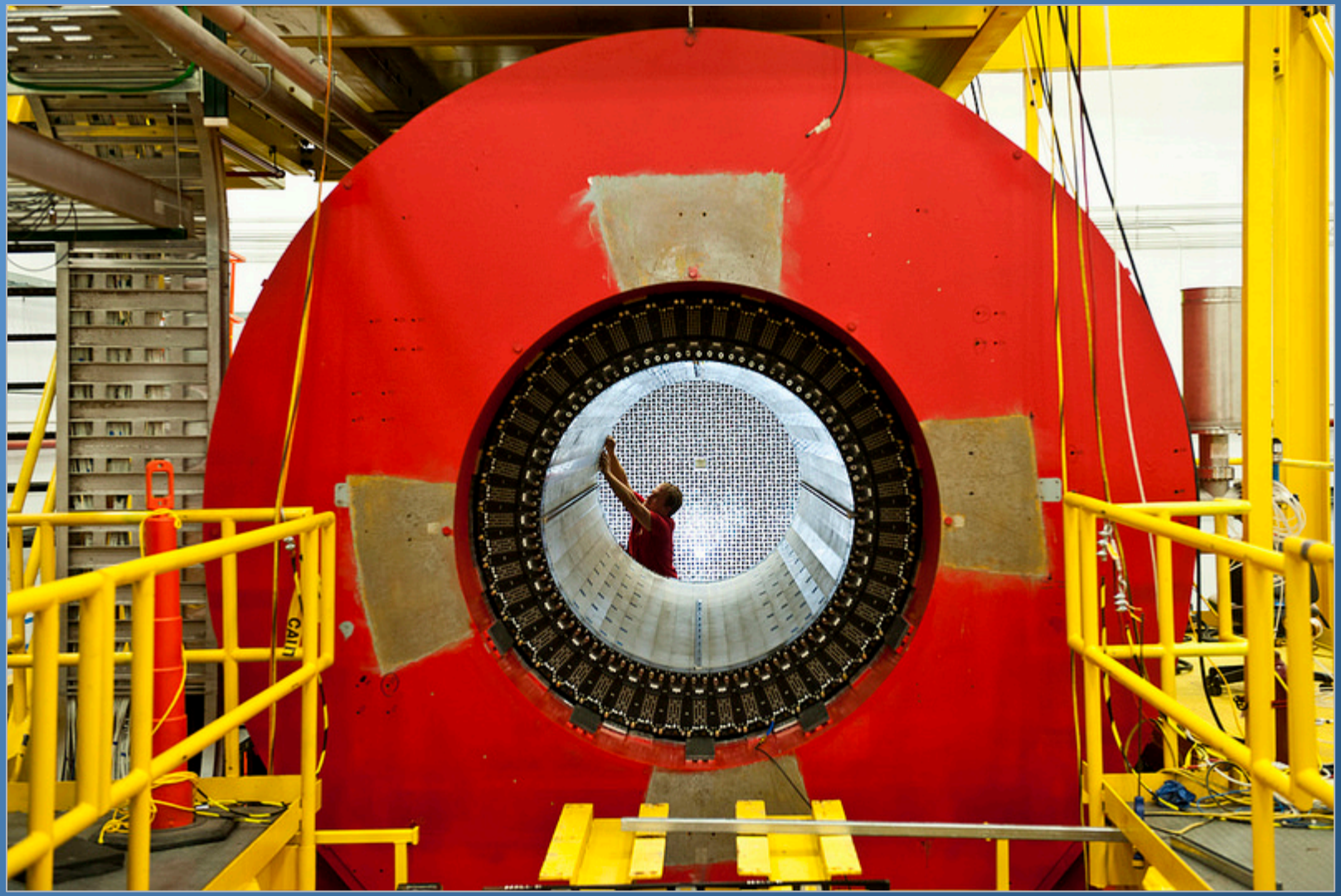
Beamline 11.0.2 at the Advanced Light Source at Lawrence Berkeley National Laboratory

Neutron Scattering Sources



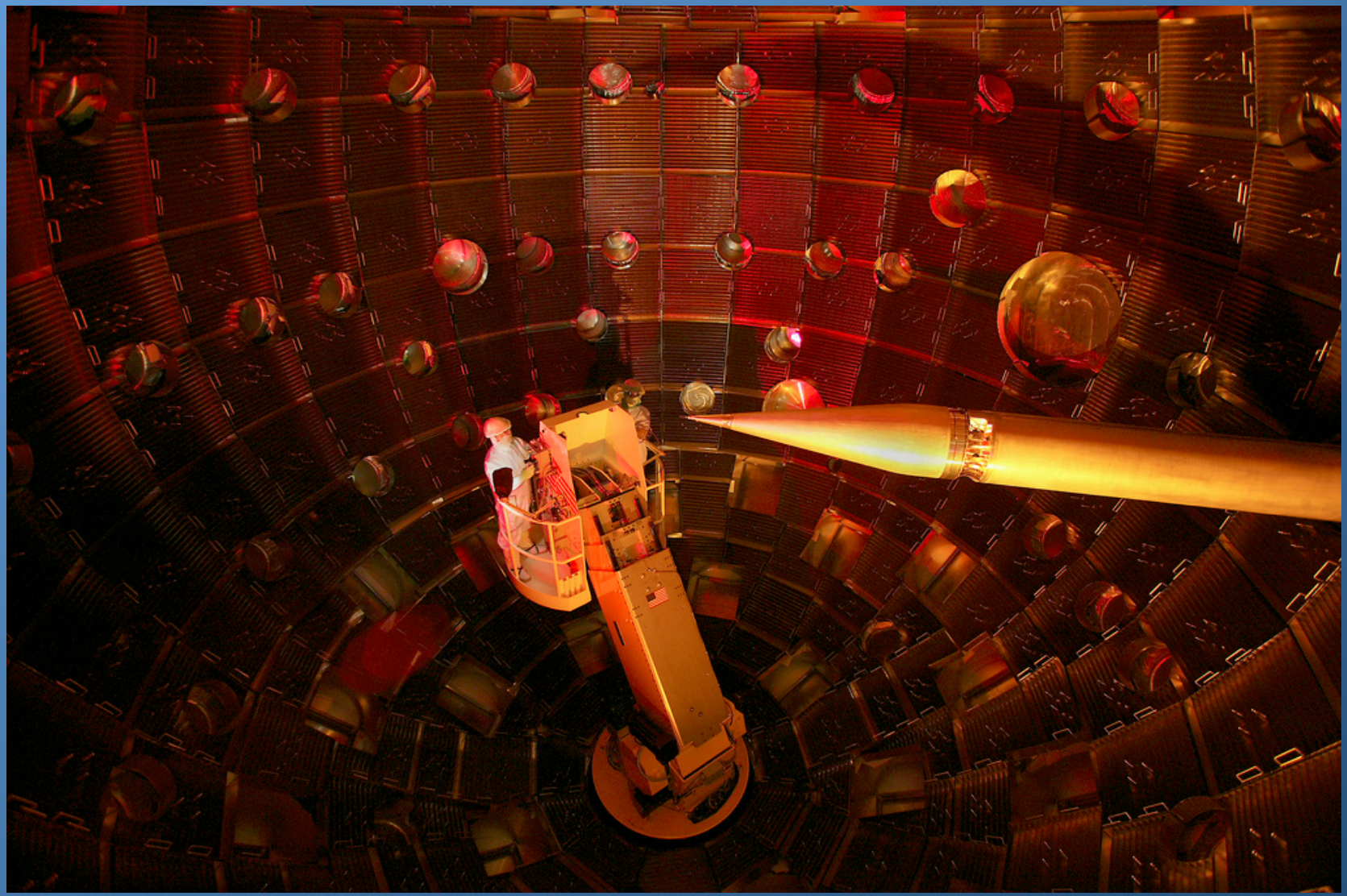
The Spallation Neutron Source chamber at Oak Ridge National Laboratory

High Energy Particle Detectors



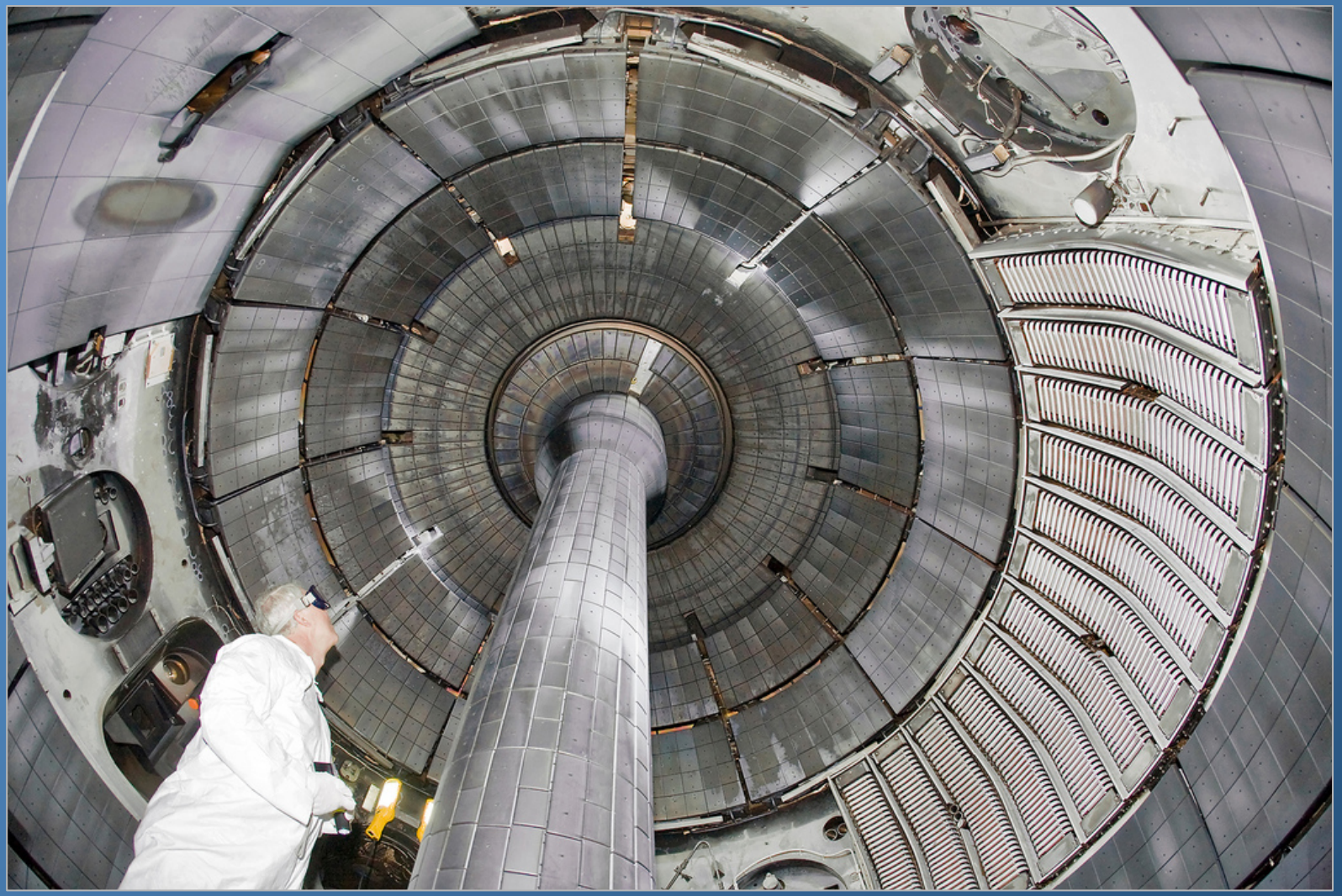
Superconducting Solenoid installed at Jefferson Lab

Fusion Research



National Ignition Facility target chamber at Lawrence Livermore National Laboratory

Fusion Research

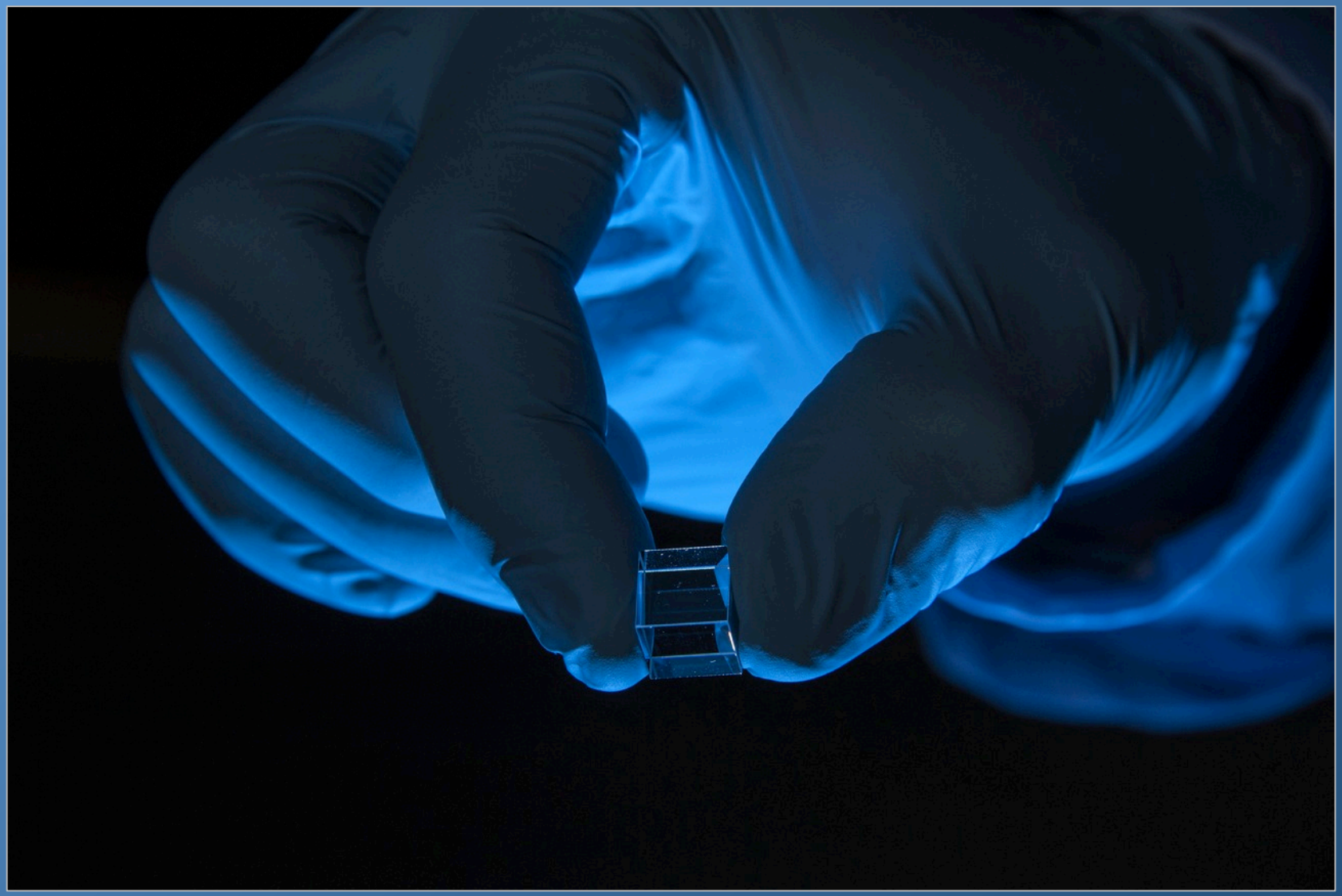


National Spherical Torus Experiment at Princeton Plasma Physics Laboratory

Critical Materials

Retech plasma furnace used in Ames Laboratory's Materials Preparation Center

Advanced Materials for Radiation Detection



Researchers at Savannah River National Laboratory are developing photonic crystals for enhanced radiation detectors

Additive Manufacturing

Robotic hand fabricated at Oak Ridge National Laboratory using additive manufacturing technology

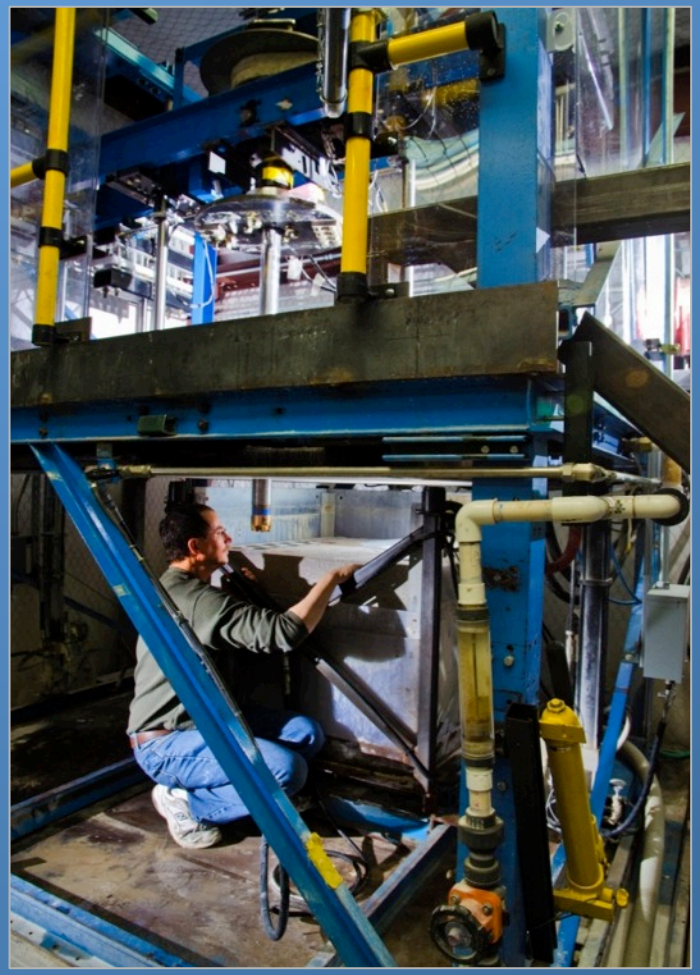
Technologies Being Developed and Accomplishments

Competitive Solar Generation

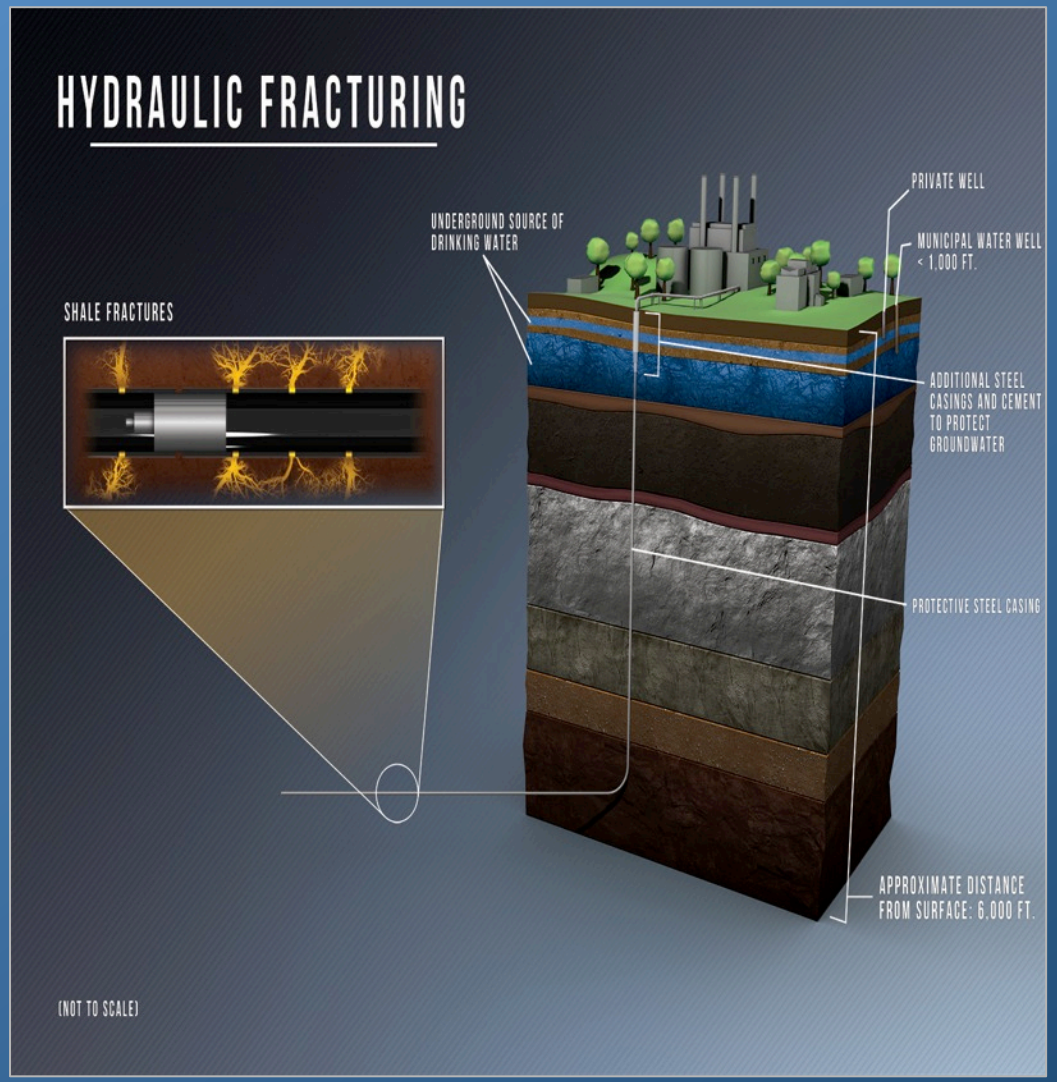
A First Solar associate at the company's Ohio manufacturing plant, which uses technology developed at the National Renewable Energy Laboratory

Courtesy of First Solar

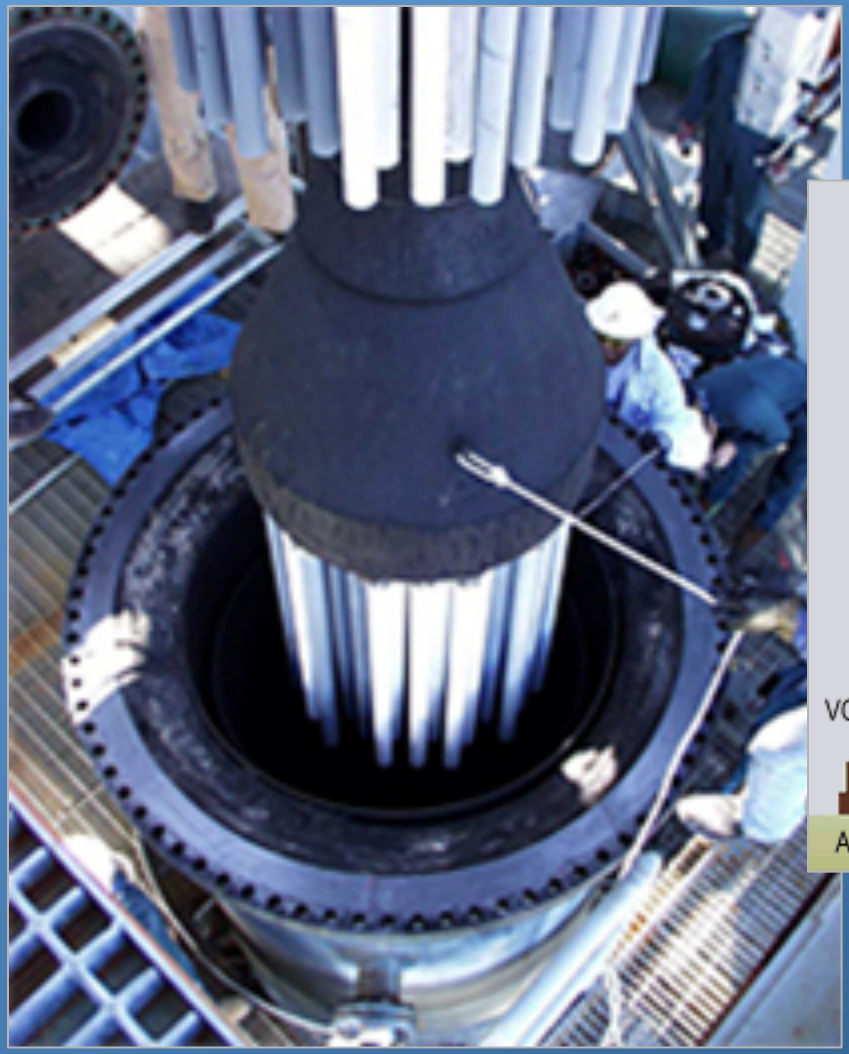
Shale Gas Revolution



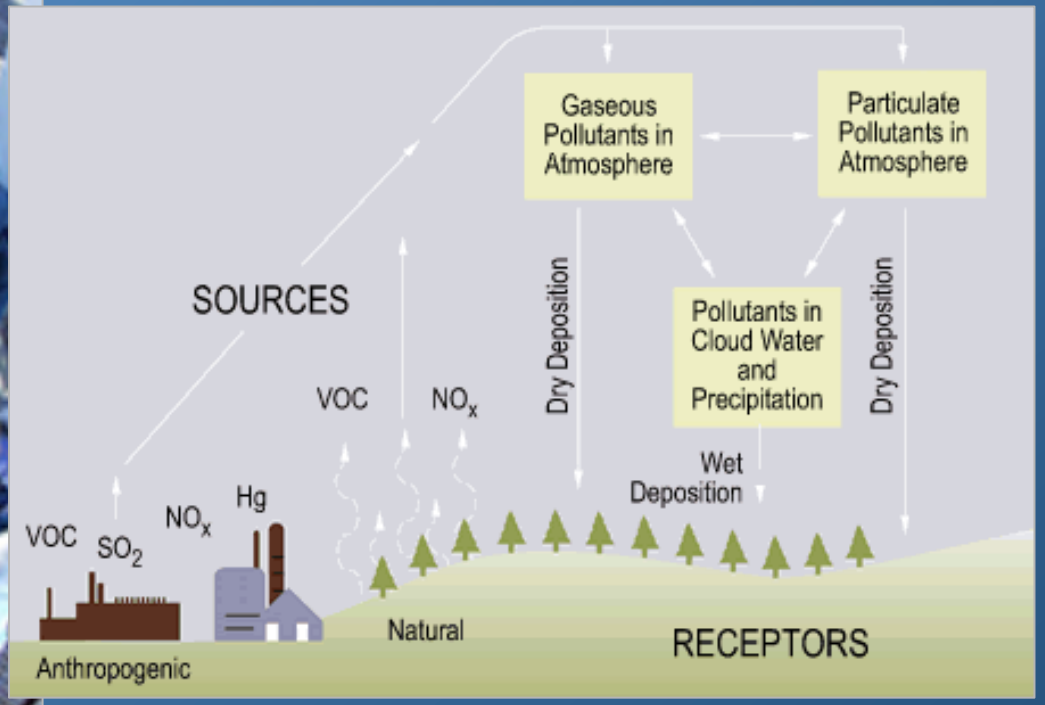
Prototype drill bit used for an experiment in Sandia National Laboratory's Hard-Rock Drilling Facility



Advanced Emissions Controls

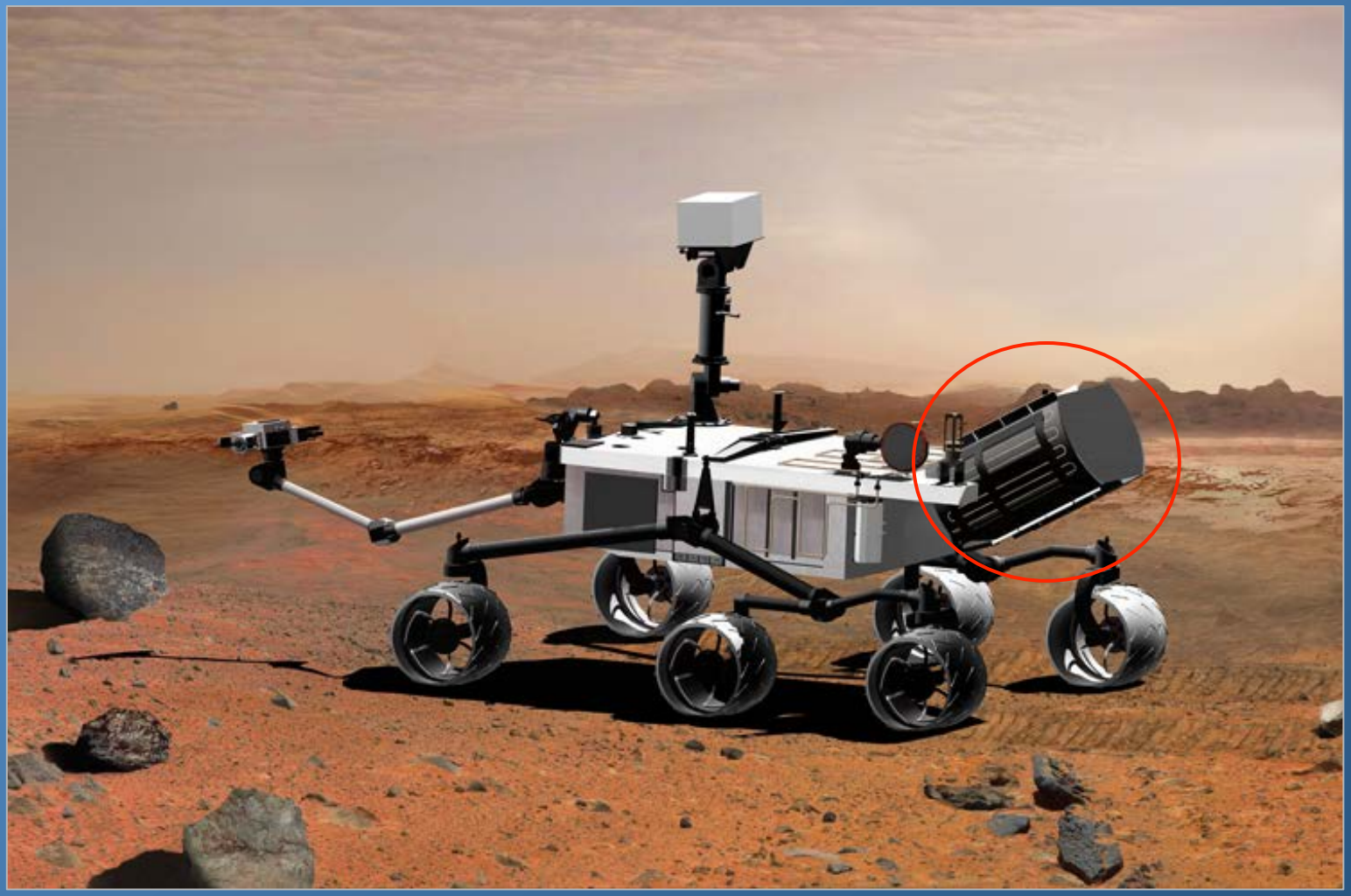


Candle Filter System at the National Energy Technology Lab



Acid Rain Cycle

Space Exploration



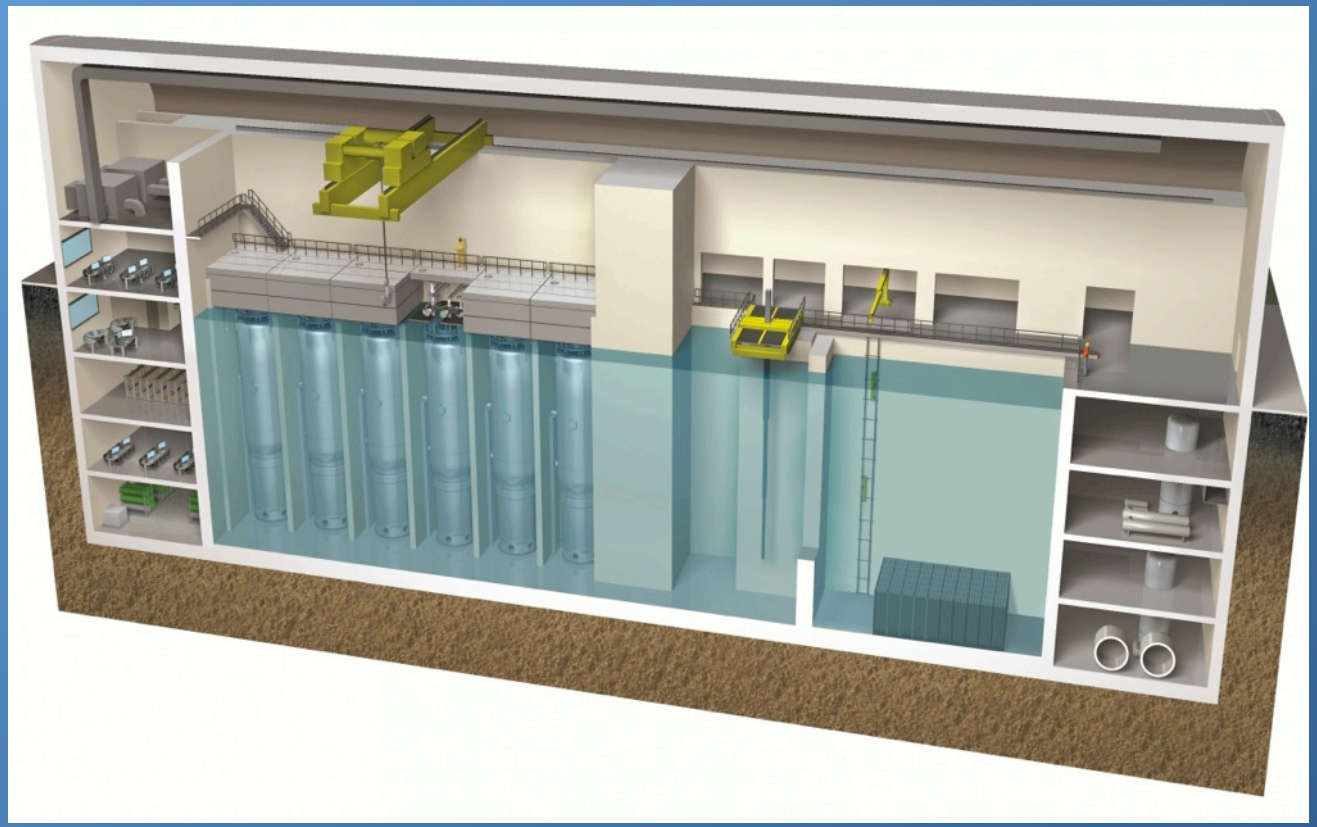
Mars Rover, Curiosity, powered by the Multi-Mission Radioisotope Thermoelectric Generator Advancement designed at Idaho National Laboratory

Photo courtesy of NASA/JPL-Caltech

SuperTruck Initiative

Supercomputing simulations at Oak Ridge National Laboratory led to the UnderTray System, dramatically reducing drag and increasing fuel mileage

Small Modular Nuclear Reactor



NuScale Nuclear Power Reactor

Carbon Capture & Storage

Carbon capture technology testing at the National Carbon Capture Center located in Wilsonville, Alabama

Smart Grid Technologies